

Length  $6\frac{1}{4}$  inches, greatest diameter  $3\frac{1}{6}$ ; aperture with the canal  $3\frac{5}{8}$  long,  $1\frac{1}{4}$  wide.

*Hab.* — ?

This species has lately been purchased by the British Museum, and, although of large size, is apparently undescribed. It is a ponderous shell, in form not unlike certain species of the genus *Fasciolaria*, and well distinguished by the character of its sculpture. The uppermost of the spiral ridges forms the thickening beneath the sutural line; and the two beneath are a little finer than the three others upon the lower convex half of the whorls.

XXXVI.—*Some Sponges from the West Indies and Acapulco in the Liverpool Free Museum described, with general and classificatory Remarks.* By H. J. CARTER, F.R.S. &c.

[Plates XI. & XII.]

[Concluded from p. 301.]

Family 2. **Suberitida.**

Group **LAXA.**

*Cliona caribbea*, n. sp.

Sponge excavating; appearing on the surface of old coral (*Porites*) in irregularly scattered subcircular holes, varying in size under a quarter of an inch in diameter, which communicate through short channels with cavernous ragged excavations interiorly; channels filled with tubular processes of the sponge, open and margined at the holes or closed by a perforated diaphragm, communicating internally with the sponge, which tapestries the cavernous excavations. Texture loose. Colour ochraceous yellow. Vents represented by the open holes; pore-area by the diaphragms. Spicules of two forms, viz. :—1, skeletal, pin-like, smooth, curved, consisting of a spherical head followed by a constriction and then a fusiform shaft, about as wide in the thickest part as the head, gradually terminating in a sharp point, length about 95 by  $2\frac{1}{2}$ -6000ths of an inch (Pl. XII. fig. 26, *a*); 2, flesh-spicule, a spinispirula, extremely slender, about 7-6000ths inch long, presenting five or six bends (fig. 26, *b, c*). Size of specimen indefinite and undeterminable, from the internal extent of the excavations being concealed.

*Hab.* Marine. Burrowing in hard calcareous objects.

*Loc.* Island of St. Vincent, West Indies.

*Obs.* The characters generally of this sponge are almost identical with those of our *Cliona celata*, when burrowing in calcareous objects; but the globular form of the head of the skeletal spicule, taken on an average, and the presence of the flesh-spicule cause it to differ. Whether or not *Cliona caribbea* ever occurs in a *free* state analogous to *Rhaphyrus Griffithsii*, Bk., which is that taken by *C. celata* after having completely destroyed the oyster-shell in which it may have been burrowing, must be determined by further research.

#### General Observations.

Here it may be stated that, without mounting a microscopic fragment of this sponge in balsam, the flesh-spicules, from their extreme delicacy, would pass unnoticed; and such is the case with many other sponges of this kind, in which the minute size and crooked spinispirular form of the flesh-spicule render the latter difficult of detection until the sarcode is made clearer and more homogeneous by drying and subsequently mounting in Canada balsam. At the same time it must be remembered that the flesh-spicules are chiefly confined to the surface in many instances, and therefore may not be seen in a fragment from the interior, also that they do not exist in all these sponges; hence the necessity of determining these points in the way that I have mentioned.

The spinispirula in the Suberite sponges, by which is meant those in the groups *Cavernosa*, *Compacta*, and *Laxa*, was first noticed by Dr. Bowerbank in 1864 (*Mon. Brit. Spong.* vol. i. pl. iii. fig. 72), when, together with an unspined spirula (*ibid.* fig. 71), it was found inadvertently in *Halichondria sanguinea*, *Johnst.* (*ib.* p. 239), where he considered them to be of "extraneous" origin; but when we remember that no sponge, in texture and spiculation, is more suberitic, *i. e.* cork-like, than a dried *H. sanguinea*, the presence of such spicules there does not seem strange; but it is strange that the *identical* form of this spinispirula should be repeated eight years afterwards (*Proc. Zool. Soc.* 1872, pl. xlix. fig. 7) as the type spicule of a large free massive Suberite of an ochre-yellow colour from Madeira, called by Dr. Bowerbank "*Hymeniacidon angulata*," when one from the sponge itself, with the slightest difference (for there are no two spinispirulas exactly alike), would have been much more satisfactory.

In 1864 also, Schmidt gave a good figure of a spinispirula (*Spong. Adriat. Meeres*, 1st Suppl. Taf. iv. fig. 12) from a "corticate" sponge (*Rindschwamm*) from the island of Cyprus, but without any further notice.

Meanwhile Albany Hancock (in 1867) found, described, and figured the spinispirula in several "Excavating Sponges" ('Annals,' vol. xix. p. 229, pls. vii. and viii.).

Again, in 1878 Schmidt figured the spinispirula of a sponge which he described under the name of *Spirastrella cunctatrix* (Spong. Küste v. Algier, S. 17, Taf. iii. fig. 8), likening it to the one from Cyprus, and also that of *Tethya bistellata* (Spong. Adriat. Meeres, S. 45, Taf. vii. fig. 1); lastly, in 1870 he gave this form for the flesh-spicules of his *Chondrilla phyllodes* and *Vioa Johnstonii* respectively (Spong. Atlant. Gebietes, Taf. vi. figs. 1 and 18). Here it might be observed cursorily that, however much the stellate and spinispirular flesh-spicules may be but transitional forms of one another, as stated by Schmidt (*op. cit.* S. 5), yet the same cannot be said of the acerate and pin-like spicules which respectively characterize his *Vioa Johnstonii* of 1862 (Spong. Adriat. Meeres, S. 78, Taf. vii. fig. 17) and that of 1870 (*l. c.*), albeit both are excavating sponges, and both possess the same beautiful carmine colour. But neither colour nor habit are always of much value in a specific point of view; for the Australian species, viz. *Alcyonium purpureum* of Lamarck, which is also a Suberite, and another Australian species in the Liverpool Free Museum, although equally carmine in colour, are different in spiculation, if not in habit also, from the presence of the spinispirula in the former with a fine structure, and the absence of it in the latter with a gritty one of adventitious matter. Hence I should be inclined to change the name of Schmidt's *Vioa Johnstonii* of 1862 to that of *Vioa Schmidtii*, which in the form of its skeleton-spicule, viz. an acerate, agrees with my *Rhaphidhistia spectabilis* of the Mauritius ('Annals,' 1879, vol. iii. pl. xxvi. figs. 13 and 14). The spinispirula, under various forms, is so often combined with a pin-like skeletal spicule, and the latter is so generally characteristic of the Suberite-sponges, that we cannot help connecting them with this kind of spiculation; at the same time it is not *always* the case, as the occurrence of an acerate form in the instances just mentioned proves. To be able to demonstrate a *corky* texture in sponges which hardly exceed a mere film in thickness, as in *Rhaphidhistia spectabilis*, which possesses the longest and most beautiful spinispirula that I have ever seen, is of course impossible; hence the spiculation alone here remains for guidance.

Having mounted fragments of many Suberites for the purpose of proving what I have above stated—that is, to see if they contained any flesh-spicule besides the pin-like skeletal one,—I will give a list of those that I myself have examined,

including such as have been found by others to present the spinispirula or any other form of flesh-spicule; in doing which, it will be best to divide them into the three groups mentioned in my Classification, viz. the Cavernosa, Compacta, and Laxa, typified respectively by *Rhaphyrus Griffithsii*, Bk., = *Cliona celata*, Johnst. (the free form of an excavating sponge!), *Suberites domuncula*, Sdt., = *Halichondria suberea*, Johnst., and *Cliona corallinoides*, Hancock. But to this I must now add a fourth group under the name of "Subcompacta," typified by *Suberites massa*, Sdt., because I find that it will be more convenient to limit the "Compacta" to the strictly compact forms, to keep the "Laxa" chiefly to the excavating Suberites, and to make the "Subcompacta" a group between the "Cavernosa" and "Compacta," since the coarser cellular structure of *Rhaphyrus Griffithsii*, *Rhaphiophora patera* (Neptune's cup), &c., which mostly have a grey or brown colour, cannot be so advantageously classed with the less coarse ones, which are chiefly of an ochraceous-yellow colour—all, however, having, like the "Cavernosa," that condensed structure on the surface which seems to have led Schmidt to place his *Spirastrella cunctatrix* among his "Corticatæ" ("Rindschwämme," Spong. Küste v. Algier, 1868, p. 17).

In giving this indication of the Suberites that I have examined (of course, all in the dried state) to see if they contain any flesh-spicule, it will also be desirable not only to catalogue them as above mentioned, but, in each group, to divide those which do *not* from those which *do* possess a flesh-spicule. Again, as the form of the spinispirula differs in different species, it will be desirable to add some note of this, in which the largest size is given respectively, remembering that they will be found in each instance in a fragmentary or less perfect state in all sizes below this. Lastly, as I shall have to introduce some hitherto undescribed species, it will be necessary, where possible, not only to name but to briefly characterize some of them at the same time.

*List of Suberites with and without the flesh-spicule.*

CAVERNOSA.

Without flesh-spicule.

*Rhaphyrus Griffithsii*, Bk., = free form of *Cliona celata*.

*Rhaphiophora patera*, Gray (Neptune's cup).

With flesh-spicule.

*Spongia Dysoni*, Bk. This is the name on the largest specimen of this sponge in the British Museum, presented in 1862. = *Hymeniacidon pulvinatus*, Bk., on a small specimen of the same species presented in 1872. At Belize, the locality of this sponge, an enormous specimen is said to have been found growing on a rock which could not be touched with the oar of the boat; and hence its head alone was taken off for preservation. It is still undescribed; but there are many specimens of it in the British Museum under my running no. 457, the two largest of which are flat pieces, registered nos. 66. 5. 24. 12 and -13, labelled "*Spongia Dysoni*," the former in size  $20 \times 25 \times 4\frac{1}{2}$ , and the latter  $33\frac{1}{2} \times 27\frac{1}{2} \times 8$  inches in their greatest dimensions.—*Character*. Massive, convex. Structure cellulo-cavernous. Colour in the dry state grey-violet. Surface smooth, remarkably irregular from its nodular projections, furnished plentifully with isolated cribriform patches of vent-holes, which open into the cellular cavities beneath. Skeletal spicule pin-like (Pl. XII. fig. 25, *a*); flesh-spicule a spinispirula with five bends about 4-6000ths inch long (fig. 25, *b, c*).

*Suberites capensis*, mihi, n. sp.—*Character*. Massive, cake-like, flat compressed, semicircular. Structure cellulo-cavernous. Colour brown externally. Surface uniformly rough, and compact on each side, loose on the margin, which is semicircular and an inch thick, where the vents, which are large and numerous, are situated, Pandean-pipe-like. Skeleton-spicule pin-like; flesh-spicule a spinispirula with four bends about 5-6000ths inch long. In the British Museum labelled "Port Elizabeth," running no. 10, registered no. 71. 6. 5. 1. Size  $14\frac{1}{2} \times 5\frac{1}{2}$  inches by 1 inch thick.

#### SUBCOMPACTA.

Without flesh-spicule.

*Suberites antarcticus*, mihi. British Museum, running no. 405, registered 44. 4. ? . ? . Dredged by Sir James Ross in  $74\frac{1}{2}^{\circ}$  S. lat., in 206 fathoms (Expedition of 1841), undescribed. *Character*. Stipitate branched; branches digitate, nodose, pollachotomous; structure subcavernous; colour dark house-mouse; spicule pin-like, with large spherical head. Size of specimen about  $5\frac{1}{2} \times 3$  inches.

*Suberites*, ? sp. Undescribed. Liverpool Free Museum. Structure charged with grit, ? sea-bottom detritus; colour deep carmine. Australia.

*Suberites*, ? sp. Undescribed. Mauritius. *Character*. Massive, growing into short branches on the surface; colour ochre-yellow. In my cabinet.

*Suberites*, ? sp. Undescribed. *Character*. Massive, growing into short branches; colour ochre-yellow. Coast of Portugal. Kent collection, British Museum, no. 4. Size  $3 \times 4 \times 1\frac{1}{2}$  inches.

*Suberites massa*, Sdt. *Character*. Massive, sub-branched; colour ochre-yellow. Adriatic. Type specimen in British Museum.

N.B. The last three species will probably be found to be the same.

*Suberites*, ? sp. *Character*. Massive, growing among and enclosing shell-detritus; colour ochre-yellow. Tucacas, in "small lagoon." Expedition of the 'Argo.'

*Obs.* The habit of enclosing fragments of hard calcareous objects, which finally disappear among the substance, is very common among the *Suberites*, giving them a gritty character; but whether this be for the organic or mineral matter, or both, that they contain, I am not able to say; it may be for the carbonic acid with the lime; but be this as it may, *Suberites domuncula* is often found under a shell-like form, having thus destroyed the shell itself on which it grew, while the destruction of shell-tissue by the burrowing (excavating) sponges is notorious.

#### With flesh-spicule.

*Spirastrella cunctatrix*, Sdt. 1, Algiers, "im frischen Zustande wahrscheinlich violet oder roth." 2, Mauritius, ? violet or purple washed out. Bowerbank collection, British Museum. 3, Australia; colour the same; specimen rounded by attrition; surface rough, tuberculate; size  $6 \times 4 \times 2$  inches. Bowerbank collection, British Museum. Spinispirula very stout, the largest and most perfect about 10-6000ths inch long.

*Spirastrella cunctatrix*, variety. Mauritius. On a little crab's back about half an inch in horizontal diameter. Liverpool Free Museum. *Character*. Amorphous; colour white. Spinispirula very short and thick, composed of two bends 11 by 9-6000ths inch in its greatest dimensions (including the spines). This appears to be a monstrous "variety" on account of the number of grotesque forms assumed by the skeletal spicule in which the spinispirula appears to take part.

*Suberites*, ? sp. Undescribed. *Character*. A group of ob-conical tubes united at the base, presenting a warty or tuber-

cular surface outside; colour ochre-yellow. Size  $6 \times 4 \times 2\frac{1}{2}$  inches. Australia. Bowerbank collection in British Museum. Spinispirula stoutish, consisting of four bends 10-6000ths inch long.

*Suberites*, ? sp. Undescribed. Mauritius. *Character*. Massive; colour ochre-yellow. A fragment in my cabinet. Spinispirula thin, small, consisting of three bends 5-6000ths inch long.

*Suberites*, ? sp. Undescribed. Belize. *Character*. Massive, lobate; verrucose on the surface; colour ochre-yellow. Liverpool Free Museum. Presented by Dr. Archer. Spinispirula thin, but very perfect, consisting of four bends 10-6000ths inch long.

*Suberites coronarius*, mihi. Undescribed. Honduras, Jamaica, Bahama Islands. *Character*. Massive, lobate, verrucose on the surface; colour ochre-yellow. Bowerbank collection, British Museum. Spinispirula consisting of one bend, semi-circular, with the spines on the outside and over the ends only; spines capitate and in single file. Size about 4-6000ths inch long (Pl. XII. fig. 27, *b*, *c*).

*Suberites*, ? sp. Undescribed. Trincomalee. *Character*. Massive, sessile, growing up into conical lobes, more or less rugose at the base, warty; colour dark yellowish brown. Size  $3 \times 2 \times 1\frac{1}{2}$  inches. Bowerbank collection, British Museum. Spinispirula variable in size; the largest consisting of four bends, 8-6000ths inch long.

*Hymeniacidon angulata*, Bk. (Proc. Zool. Soc. 1872, p. 632, pl. xlix.), Madeira. Sessile, coating; ochreous yellow. Size of largest piece  $12 \times 7\frac{1}{2} \times 2$  inches. Spinispirula "minute," variable in form. No measurement given.

*Alcyonium purpureum*, Lam. Australia. Colour a beautiful carmine. Spinispirula, like all the rest, very variable in form and size, the largest and most perfect consisting of one and a half to two bends, 5-6000ths inch long (Pl. XII. fig. 28, *b*, *c*).

Of this sponge I have only seen a small slice, about 3 inches long and 1 inch square, evidently cut out from a much larger specimen, and bearing the condensed surface, with the sub-cavernous or subcompact structure internally, common to the group. (British Museum, "Lamarck collection," nos. 46 and 42 together.)

## COMPACTA.

Without flesh-spicule.

*Hymeniacidon carnosa*, Bk. British Seas, = *Halichondria carnosa*, Johnst. Also from Vancouver's Island, between tide-marks. British Museum, no. 317, registered 68. 8. 17. 26, labelled "J. K. Lord, Esq."

*Suberites montiniger*, Cart. Barents Sea. Colour greyish black ('Annals,' 1880, vol. vi. p. 256).

With flesh-spicule.

*Halichondria suberia*, Johnst., = *Suberites domuncula*, Sdt. British and other seas. Flesh-spicule a short curved cylindrical acerate with obtuse ends, inflated in the centre, microspined and about 8-6000ths inch long. (Bowerbank, Mon. B. S. vol. i. pl. iv. fig. 95.)

*Halichondria ficus*, Johnst. British and other seas. Flesh-spicule the same.

*Suberites montalbidus*, Cart. Barents Sea. Colour greyish white. Flesh-spicule the same, but *pointed* at the ends ('Annals,' 1880, vol. vi. p. 256). ? Equal to *S. Lutkenii*, Sdt., Greenland (Spong. Atlant. Gebiet. S. 47).

## LAXA.

Without flesh-spicule.

*Cliona celata*, Johnst. British and other seas. Burrowing in hard calcareous objects, especially oyster-shells, also in limestone rocks.

With flesh-spicule.

*Cliona northumbrica*, spinispirula 1-1800th, *C. vastifica*, s. 1-2100th, *C. corallinoides*, s. 1-2000th, *C. gracilis*, s. 1-1500th, *C. Howsei*, s. 1-600th, *C. mazatlanensis*, s. 1-1300th, *C. lobata*, s. 1-500th of an inch long. (Hancock, 'Annals,' 1867, vol. xix. p. 229, pls. vii. and viii.)

*Cliona vermifera*. Smooth spirula, five bends, "scarcely" 1-400th inch long. (Hancock, *ibid.*)

*Cliona abyssorum*. Smooth spirula, eight bends, 1-300th inch long. (Carter, *ibid.* 1874, vol. xv. p. 249, pl. xiv. fig. 33.)

*Obs.* It is easy to learn by the "smooth spirula" how the addition of spines forms the "spinispirula."



*Cliona mucronata*. Spinispirula 0·0006 inch long. *C. ensifera*. Spinispirula the same. *C. subulata*. Spinispirula thinner and longer, measurement not given. (Sollas, *ibid.* 1878, vol. i. p. 54, pls. i. and ii.)

*Vioa Johnstonii*, Sdt. (Spong. Atlant. Gebiet. S. 5, Taf. vi. f. 8). Colour carmine. Spinispirula four bends, 10 to 15-6000ths inch long. Type specimen in the British Museum.

*Vioa Schmidtii*, Carter, = *V. Johnstonii*, Sdt. (Spong. Adriat. Meeres, S. 78, Taf. vii. fig. 17). Skeleton-spicule acerate; flesh-spicule stelliform.

*Rhaphidhystia spectabilis*, Cart. Mauritius ('Annals,' 1879, vol. iii. p. 300, pl. xxviii. figs. 13 and 14). Skeleton-spicule acerate; flesh-spicule a spinispirula of nineteen bends, 1-300th inch long. The longest and most beautiful that I have seen.

*Vioa Carteri*, Ridley (Proc. Zool. Soc. 1881, p. 129, pl. xi. figs. 2 and 2 b). Colour carmine. Spinispirula 0·412 millim. long = 8-6000ths inch. "Victoria Bank," off S. Brazil.

It must not be thought that the foregoing list embraces the whole of the Suberites proper (that is, the sponges which belong to the four groups above mentioned), but rather only a few of them, to show that the pin-like skeletal spicule is often accompanied by a spinispirular or other flesh-spicule, as well as often without it. There are, of course, scores of instances in which neither might be the case, ex. gr. *Suberites fistulatus*, in which the skeleton-spicule is inflated at both ends and the flesh-spicule an equianchorate ('Annals,' 1880, vol. vi. pl. v. fig. 22). Or the skeleton may be acerate (pointed at both ends) and the flesh-spicule a stellate, as just noticed in *Vioa Schmidtii*, Carter. Then, in general form, the species may be furnished with long tubular appendages, as in *S. fistulatus* also; or the colour may be soot-black, as in *S. fuliginosus* ('Annals,' 1879, vol. iii. p. 347, pl. xxviii. fig. 9). In short, there are so many more sponges already described, and so many more likely to be discovered which might be relegated to one of the four groups mentioned, that, although in my "Notes" &c. I have proposed to give a third part, in which these and every other published species of sponges would be catalogued, I must, for want of time, leave this useful compilation to some one else, and content myself with the few suggestive remarks (notes) that I am now making.

There is also the genus "*Latrunculia*" of Bocage, in which an acuate or acerate skeleton-spicule, as the case may be, is,

in several species, combined with the flesh-spicule that I have termed "sceptrella" ('Annals,' 1879, vol. iii. p. 358, pl. xxix. figs. 13-21), which so often passes into the "spini-spirula," that both forms may sometimes be found together in the same sponge, ex. gr. *Latrunculia corticata* ('Annals,' 1879, vol. iii. pl. xxvii. fig. 1, a, b, c).

*Terpios fugax*, de Fonbr. et Mich. (p. 102, pl. xxiv. fig. 6).

Laminiform, almost immeasurably thin, spreading over hard objects (*Porites*) in the manner of paint. Colour copper-green. Surface in form that of the object over which it may be growing. Consistence sarcodic (no fibre), charged with the spicule of the species, together with innumerable globular bodies (? cells), extremely minute and of a copper-green colour. Spicule of one kind only, viz. pin-like, smooth, very thin, slightly curved; head globular, acuminate terminally, followed by a thin shaft, which, after a short distance, gradually diminishes to a sharp point, about  $70$  by  $\frac{1}{2}$ -6000th inch in its greatest dimensions (Pl. XII. fig. 29), scattered plentifully and irregularly throughout the sarcodic film of which the sponge is composed. Size of the largest specimen about that of the branched one of *Porites furcatus* over which it has grown, about  $3\frac{1}{2}$  inches in diameter.

*Hab.* Marine. Growing over hard objects.

*Loc.* Falmouth Harbour, Antigua.

*Obs.* This appears, from description and illustration, to be *Terpios fugax*, De F. et M.; but, from the form of the spicule not having been given, it is impossible to go beyond the description and representation for identification.

There is a species which grows on the rocks of this shore (Budleigh Salterton) in small patches, to which I have alluded in my paper on the "Parasites of the Spongida" ('Annals,' 1878, vol. ii. p. 164), chiefly to notice the presence of the parasitic oscillatorian (*Hypheothrix cærulea*, Carter) to which it owes its beautiful colour; but as I have never published any description of the sponge itself, I will now do it under the name of

### *Terpios cærulea.*

Laminiform, almost immeasurably thin, spreading in little patches over the surface of the New Red Sandstone rocks here. Colour cobalt-blue when fresh, fading much on drying, but not disappearing altogether. Consistence sarcodic (no fibre), charged with the spicule of the species, and innumerable short parasitic oscillatorian filaments (*Hypheothrix*

*cerulea*, Carter), whose granules or cells bear the colouring-matter of the sponge (Pl. XII. fig. 30, *b, c*). Spicule of one kind only, viz. pin-like, smooth, slightly curved; head globular, acuminate terminally, followed by a narrow, annular inflation, and then a conical shaft, which, after a short distance, becomes diminished gradually to a sharp point; about 80 by 1-6000th inch in its greatest dimensions (fig. 30, *a*); scattered plentifully and irregularly throughout the sarcodic film of which the sponge is composed. Size of largest specimen seen about half an inch square.

*Hab.* Marine. Growing over hard objects.

*Loc.* Budleigh Salterton, S. Devon.

*Obs.* This appears to be an instance of what the Germans call "symbiosis." There is very little difference, except in colour, between it and the foregoing species, viz. *Terpios fugax*; hence I have adopted De Fonbressin and Michelotti's generic name for this kind of sponge. The form of the spicules appears to be the same, in so far as they are not fusiform, but diminish gradually from the head to the point, that of the British species being the largest. As regards the colouring material, this is situated in free granules (? cells) in *Terpios fugax*, which in *T. cerulea* are in short oscillatorian sheaths. Dr. de Fonbressin in his "Review" states that, as these sponges often penetrate into the cavities of marine objects (? *Vioa viridis*, Sdt.), the genus *Terpios* establishes "une véritable transition aux Eponges perforantes" (p. 49)—that is, the excavating Suberites in my group *Laxa*. Of the same character appear to be *Rhaphidhistia spectabilis* and *Hymenophyllum spiniglobata* (Annals, 1879, vol. iii. pp. 300 and 301, pl. xxvi. figs. 13 and 15, &c.).

#### DONATINA.

Turning our attention to the remaining group in the family Suberitida, viz. "*Donatina*," we find its subdivision already foreshadowed by the number of different sponges hastily, and therefore *provisionally*, inserted under this heading ("Notes," &c., p. 198).

Thus all the species from *Suberites appendiculatus* to *Trachya pernucleata*, with their like, might be included under a group named "Polymastina," as stated in the 'Annals' of 1876 (vol. xviii. p. 392), which group might be again subdivided into two sections, one of which presents a delicate structure and is well represented by the British species in Dr. Bowerbank's third volume, ex. gr. *Polymastia robusta* (Mon. B. S. vol. iii. pl. x. fig. 5, 1874), and the other just the opposite, viz. an *intensely compact* and hard structure,

well represented by the Cape species briefly described in the 'Annals' (*l. c.* p. 393), for which I would now propose the name of *Trachya durissima*, as the genus was characterized in 1870 ('Annals,' vol. vi. p. 178, pl. xiii. figs. 11-16). The spiculation in both sections is the same, viz. a stout skeletal spicule radiating from the centre, faced by a minute one which, inserted between the pointed ends of the former, gives a compactness to the surface; both spicules are for the most part acute or pin-like, although the skeletal one in *Trachya pernucleata* (*op. et loc. cit.*) happens to be acerate; while the extreme compactness of the genus *Trachya* makes it resemble *Donatia lyncurium* so much that the Cape species of *Polymastina* (viz. *Trachya durissima*) might be easily mistaken for it at first sight. Keller's *Tuberella*, found in the Bay of Naples, appears to me to belong to this section (Archiv f. mikroskop. Anatomie, Bd. xviii. S. 276, Taf. xiv. 1880).

For *Axos Cliftoni* I have provisionally proposed a group under the name "Axona" ('Annals,' 1881, vol. vii. p. 381); but, as already stated, the examination of the species *Phorbas amaranthus*, de F. et M., from the West Indies, has thrown so much light on the Australian species *Axona anchorata* and *A. fibulata*, which were described from very "imperfect specimens" ('Annals,' *l. c.* pp. 382, 383), that I would now relegate them to the group *Halichondrina* under the generic name of "*Phorbas*."

#### XENOSPONGIA.

For *Xenospongia patelliformis*, from Torres Straits, and *Halicnemia patera*, Bk., a British species, there might be a group named "Xenospongina," = *Xenospongiadæ*, Gray ('Arrangement of Sponges,' Proc. Zool. Soc. 1867, p. 547). See spiculation (Pl. XII. fig. 32, *a-c*).

#### PLACOSPONGIA.

Again, for *Placospongia melobesioides*, from Borneo, Ceylon, and South America, there might be a group named "Placospongina," = *Placospongiadæ*, Gray (*op. et loc. cit.* p. 549), in which the skeleton-spicule is pin-like (Pl. XII. fig. 33, *a, b*), combined with a spinispirular flesh-spicule, like that of a *Suberite* (fig. 33, *e, f, i*), faced and axiated (for the sponge is branched) by a massive aggregation of elliptical siliceous balls like those of a *Geodia* (fig. 33, *e, g*), or mixed with a small spherical subspined one like that of *Chondrilla nucula* (fig. 33, *d, h*)—thus uniting in spiculation two groups, viz. the *Suberites*, as above divided, and *Geodina*, in which the spicular characters of the former preponderate.

## DONATIA.

Lastly, we come to the only remaining species in "Group 14," viz. *Donatia lynceurium* (after which it was named "Donatina"), which, being a corticate sponge with a peculiar structure and spiculation still allied to the family Suberitida, will be best left where it is.

Hence the emended classification would stand thus:—

## Order VI. HOLORHAPHIDOTA.

## Family 2. Suberitida.

- |                     |                       |
|---------------------|-----------------------|
| Group 1. CAVERNOSA. | Group 5. POLYMASTINA. |
| 2. SUBCOMPACTA.     | 6. XENOSPONGINA.      |
| 3. COMPACTA.        | 7. PLACOSPONGINA.     |
| 4. LAXA.            | 8. DONATINA.          |

It must not be considered that these are all hasty speculations, which have only to be read and forgotten, but rather that they are attempts to reduce to useful classification a number of objects which, although a part of Nature's creation, have hitherto been almost contemptuously disregarded, not so much perhaps from their having passed unnoticed, as from the question whether they belong to the animal or vegetable kingdom having been undecided. But now that they have been admitted to belong to the former, the subject must be seriously grappled with by the comparative anatomist, and a classification developed for aiding the memory, which, as in other instances of the kind, can only be produced by time, thought, and experience extending over many generations, like that of botany.

Returning to a description of the sponges belonging to the Liverpool Free Museum, I have now to add that of a curious variety of *Donatia lynceurium* dredged by Capt. W. H. Cawne Warren in the harbour of Acapulco, after which a brief history of the species of *Donatia* will be given.

*Donatia multifida*, n. sp. (Pl. XII. fig. 22, a-e.)

Membraniform, lacinulate, expanded, flat or erect, fan- or vase-shaped, proliferous. Texture hard, tough. Colour now pinkish. Surface even, presenting white lines radiating from the excentric expansions to the circumference, which is fimbriated by irregular lacinulate processes of variable length, ending in thin expansions of attachment, by which they become adherent, like the tendrils of a scandent plant, to

the hard objects (empty shells, &c.) among which the sponge may be growing (Pl. XII. fig. 22); terminal expansions of the processes charged with the flesh-spicules of the species, into which the "white line" in the process, consisting of a bundle of skeletal spicules, is spread out. Spicules of four kinds, viz.:—1, skeletal, acuate, smooth, straight or very slightly curved, obtuse and almost imperceptibly inflated at the big end, then as slightly constricted and followed by a fusiform shaft, which terminates gradually in a round point in the largest and in a sharp one in the rest, about 138 by  $2\frac{1}{2}$ -1800ths inch in its greatest dimensions, but of all sizes under this measurement; 2, flesh-spicule, globostellate,  $4$ -1800ths inch in diameter; 3, flesh-spicule, stelliform, 3-6-radiate, rays long, straight, or crooked, branched or spined irregularly, parting from each other directly (that is, without nucleus or body in the centre, thus opposed to the "globostellate" form), about 10-6000ths inch in diameter (Pl. XII. fig. 22, *d*); 4, flesh-spicule, minute, sexradiate, body globular, rays straight, ending respectively in globular inflations, which are microspined, about 3-6000ths inch in diameter (fig. 22, *e*). No. 1 is chiefly confined to the radiating bundles which form the skeleton; nos. 2 and 4, in great abundance, chiefly to the circumference, among which no. 3 is sparsely scattered. Size variable, according to extent of development; the largest specimen about an inch in diameter exclusive of the circumferential filaments.

*Hab.* Marine. Growing plentifully among the detritus of the sea-bottom in 4-9 fms.

*Loc.* Acapulco.

*Obs.* This sponge in structure, spiculation, and colour is precisely like *Donatia lyncurium*, but differs from it in its mode of growth, which looks like a globular form that had been shattered by some explosive force in the centre (Pl. XII. fig. 22, *a a*). Frequently it presents a floral or cup-like form, erect or inverted, with a naked central portion like a pistil in the centre (fig. 22, *f*). The filaments from the circumference seem to serve the purpose of propagation as well as attachment.

#### General Observations.

As *Donatia lyncurium* appears to be a world-wide species, for I have myself had specimens from Great Britain (this place), the West Indies ('Argo' expedition), the Cape, Mauritius, and South Australia, independently of the other places in which it has been found, whose differences in hardly any instance are sufficient to justify a multiplication of species, although they may

require a different nomenclature, I will here briefly state its history.

Dimly introduced among his "Aleyones" about 1725 by Marsigli, we are chiefly indebted to Donati for the first good description and figure of this sponge, in 1750, under the name of *Tethya sphaerica* (Storia nat. marin. Adriatic. Venet. pp. 60-64. n. 1, 2, tab. x.). Lamarek called it *Tethya lynceurium* (An. s. Vertèbres, 1816, vol. ii. p. 386). Montagu, in 1818, was the first to call it *Spongia*, and place it among the species of British sponges then known (Wern. Mem. vol. ii. p. 117, pl. xiii. figs. 4 and 5). In 1833 Nardo gave it the name of *Donatia lynceurium* ('Isis,' p. 522, Spongiariorum Classificatio); and Johnston introduced it into his 'History of British Sponges,' &c., under Lamarek's name (p. 85 &c. pl. i. figs. 9 and 10). In 1862 Schmidt, thus following Johnston and Lieberkühn (Spong. Adriat. Meeres, S. 44), and Bowerbank in 1866 (Mon. B. S. vol. ii. p. 92), used the same appellation.

Now came the time for separating the "*Tethya*" of Lamarek; and thus we find the late Dr. J. E. Gray, in his "Notes on the Arrangement of Sponges" (Proc. Zool. Soc. 1867, p. 492), making *Tethya lynceurium* of Lamarek the type of the first division of his family Tethyadæ under Nardo's name "*Donatia*," and *Tethya cranium*, Lam., that of the ninth division under the name of *Tethya* (*op. et loc. cit.* pp. 541 and 543 respectively).

The necessity for this separation became much more evident to me when I described and illustrated side by side *Donatia lynceurium*, from this place, and *Tethya arabica*, which I found *in situ* growing on a rock on the south-east coast of Arabia ('Annals,' 1869, vol. iv. p. 1, pls. i. and ii.). So that in 1875, when my "Notes Introductory to the Study and Classification of the Spongida" were published, I found it advisable to place *Donatia lynceurium* in the second family of my Holorbaphidota under the name of "*Donatina*," and *Tethya cranium* in the third or following family in the "Pachytragida" under the heading of "*Tethyina*;" thus it is to be hoped these two incongruous species may never again be brought together.

In 1872 the late Dr. Bowerbank described and figured a *Donatia* from S.W. Australia, which he called *Tethea Ingalli* (Proc. Zool. Soc. p. 119, pl. v. figs. 11-17); and the following year two other specimens which came from the same locality were named respectively *Tethea robusta* and *T. Cliftoni* (*ib.* pp. 10 and 16, pls. ii. and iii.); while in 1879 Dr. Béla Dezsö, of Kolozsvár, aided by Prof. F. E. Schulze's prepara-

tions, published two memoirs entering far more satisfactorily than any one who had preceded him into the general description of the microscopic characters and reproduction of *Tethya* (*Donatia*) *lyncurium* (Archiv f. mikroskop. Anatomie, Bd. xvi. S. 626, Taf. xxx.-xxxiii., and Bd. xvii. S. 151, Taf. xii.).

But in no instance has that spiniferous character of the ray been particularly noticed which is represented in my figure from a specimen of the British species found at this place ('Annals,' 1869, *l.c.* p. 27, pl. ii. fig. 6, *b*), to which I would now call attention, because its pointed and spinous form if enlarged would be analogous to that of no. 3 in *Donatia multifida* (fig. 22, *d*), and to that which we shall see hereafter becomes a character in the Cape species or variety. Sometimes the spines in the British species cover the end of the ray in the small staple stellate to such an extent as to simulate the presence of a globular inflation, which is actually the case in the Adriatic form (Béla Dezsö, *op. cit.* Bd. xvi. fig. 4), also in the Australian ones, as I learn from Dr. Bowerbank's figures (*loc. cit.*) as well as my own slides, and, indeed, in *Donatia multifida* (Pl. XII. fig. 22, *e*). But it is in the Cape species, which is more robust than any of the rest in its adult state as well as in its spiculation, that the three forms of flesh-spicules mentioned in *Donatia multifida* become most distinct, where "no. 2" (referring to the numbers in the description of *D. multifida*), the largest, viz. the globostellate, measures 30-6000ths, "no. 3," the stelliform, with spiniferous rays, 12-6000ths (Pl. XII. fig. 23), and "no. 4," the minute sexradiate, 3-6000ths of an inch in diameter respectively. In the specimen from Mauritius "no. 3" is only 5-6000ths inch in diameter; so that after all the *differences* are only in degree, and those only sufficient to form a variety. Still, hitherto it does not appear to me that this third form of flesh-spicule, viz. no. 3, so characteristically developed in the Cape species (fig. 23), has been publicly noticed.

Respecting varieties in spiculation, however, it should always be remembered that our observations are necessarily very limited, on account of their having to be made on perhaps only one or two fragments of the entire specimen, and that specimen perhaps the only one that can be obtained from the locality; whereas, if our observations had been extended further, our statements might have had to be modified, and therefore should always so far be considered provisional. Perhaps, too, for the same reason, the fragments examined by two individuals respectively might not contain exactly the same form of spicules.

Here I would also notice that the "globostellate" ("Notes,"



p. 33, *l. c.*) which comes nearest in form to that of *Donatia*, where the body is large and the spines short, is that of *Chondrilla nucula*, while that of *C. sacciformis*, Carter, from Mauritius, in size and figure is almost identical with it. Moreover there is a great resemblance in structure and spiculation between *Donatia lynceurium* and *Axos Cliftoni*, wherein the small flesh-spicule, viz. "no. 4" in the former, is almost identical in form with a similar one in the latter; and the globostellate of *Donatia lynceurium* only a modification of the sexradiate cross-like one with multifidly-spined rays in *Axos Cliftoni*, as may be seen where the *central part* or body of the latter is much enlarged.

### Family 3. Pachytragida.

#### Group GEODINA.

*Geodia tumulosa*, Bk., Proc. Zool. Soc. 1872, p. 628, pl. xlvii.

On an agglomeration of two large pebbles &c. a foot in diameter, bearing two specimens of *Polytherses*, *Cliona caribba* in *Porites*, and four species of sessile stony corals, all of considerable size, (the largest *Polytherses*, which is conical, being 5 inches high and the same in diameter at the base), together with a large piece of wood *artificially squared* and somewhat eaten by marine animals, but by no means in a state of decay, is a specimen of *Geodia tumulosa*, Bk., which has grown over nearly one third of the mass, which was found at Puerto Cabello, in the Caracas. The specimen of *Geodia* is well characterized in Dr. Bowerbank's representation of this species, the localities for which are stated to be "Honduras and Jamaica," and therefore requires no description of my own beyond the above, which is given in detail, to show by the present state of the *wood* in the conglomerate with what rapidity these marine animals grow and thus firmly cement together such large detritus.

There is another, small, thin specimen, about  $2\frac{1}{2}$  inches square, that had also grown between stones at the island of St. Vincent, and seems to be De F. et M.'s *Geodia caribba*, in which the surface-character is different from that of the foregoing specimen (apparently their *G. gibberosa*, Lam.), but which I shall presently endeavour to show is but a variation of *G. tumulosa*, Bk., and, finally, *G. gibberosa*, Lamarck.

The spiculation is the same in both the specimens from Puerto Cabello and St. Vincent: that is to say, the zone-spicule in each consists of a long shaft, terminated by three simple arms expanded laterally and a little advanced (pl. XII.

fig. 31); the forks and anchors, being the (so to speak) "grappling"-spicules, are of course always concomitants, although not always seen; while the large acerate body-spicule and the flesh-spicules, viz. the siliceous balls accompanied by the minute stellates, are also the same. Such is also the spiculation in the six species from the West-Indian seas described and illustrated by Dr. Bowerbank (Proc. Zool. Soc. 1872, '73, and '74), while there is such a sameness in other respects, that if nothing but the form of the specimens is to determine the species, so little dependence is to be placed on this that they may all be set down as the same, subject to variation.

#### General Observations.

The *Geodina*, like the *Esperina*, have in most instances so little that is different in their respective spiculations, that by this alone it is impossible to distinguish them. Size goes for nothing, since a large specimen may have large spicules and a small specimen smaller ones, while in both the *forms* are the same. Again, if we search for specific differences in general development and surface-characters, the same species under certain circumstances may assume different forms; so that, in fact, we have nothing to do but to consider them all as belonging to one species, whatever names may be used for the varieties. Thus the two specimens just mentioned have the same kind of spiculation, although the external or surface-characters differ in the way to which I shall more particularly allude presently. As already stated, the six species from the West-Indian seas, described and figured by Dr. Bowerbank (*op. et loc. cit.*), have the same kind of spiculation among themselves, and the same as those from Puerto Cabello and St. Vincent respectively. But Dr. Bowerbank has stated that the porous areas in his *G. tuberculosa* "appear like a series of impressions made by the point of a pin," while each of the porous areas in *G. tumulosa* presents a plurality of pores (P. Z. S. 1872, pp. 627 and 629 respectively); hence, if we combine the pinhole pores of *G. tuberculosa* with the adult form given by Dr. Bowerbank of *G. tumulosa*, we shall have just what is to be found in our species from Puerto Cabello, while the plurality of pores in the areas of *G. tuberculosa* may find its analogy in the specimen from St. Vincent. These facts seem to be repeated in the West-Indian specimens described and illustrated by De F. et M., inasmuch as it is stated of *G. gibberosa*, Lam., that the pores are "punctiformes" (p. 105, pl. xxv. fig. 1a), and that in their *G. caribbea* the porous area is "finement réticulée" (p. 106, pl. xxiv. fig. 8). With refer-

ence to the former of their specimens, therefore, I cannot help identifying it with our specimen from Puerto Cabello, and the latter with that from the island of St. Vincent; for *both kinds of pores exist* on the surface of the latter. Thus Dr. Bowerbank's *G. tuberculosa* and *G. tumulosa* appear to me to be the same as Lamarek's *G. gibberosa*, which also came from the West Indies.

Now I have just boiled out in nitric acid fragments of both our specimens, viz. that from Puerto Cabello and that from St. Vincent. But for the spiculation generally of the latter being a little smaller, the two are identical; and yet the surface of the former is covered with pin-holes regularly and quincuncially arranged in a thick crust of siliceous balls, &c., while the latter is for the most part covered by a dermal reticulation in which the interstices are cribbled with pore-holes in a thin one.

This discrepancy I will now endeavour to explain. It may be remembered, 1st, that in many sponges, especially among the Holorhaphidota (ex. gr. *Halichondria panicea*, Johnst., *Esperia*), the pores are situated in plurality in the delicate films of dermal sarcode which tympanize the interstices of the skeletal reticulation, thus rendered cribriform; 2ndly, that in the Psammonemata, where the dermal sarcode is thicker and the interstices (that is, the polygonal divisions on the surface) much larger, the tympanizing sarcode is again divided by a minute subreticulation of soft colourless fibre, which appears in relief on the surface of the polygonal divisions respectively, and presents one or more pores in each of its interstices; 3rdly, that in many *Hircinie* this reticulation becomes still more evident by the addition of minute microscopic objects (sand-grains, fragments of sponge-spicules, &c.), which give it a strikingly beautiful lace-like appearance, especially from its whiteness when dry; 4thly, that this addition of foreign objects often goes on to such an extent as to thicken the lines of the reticulation into a continuous incrustation, leaving only the openings of the pores.

Now we have only to apply this to *Geodia*, in which the siliceous balls and their accompanying minute stellates represent the "minute foreign objects," to understand how, in the specimen of *G. gibberosa* from the island of St. Vincent, we have a plurality of pores in the interstices, and in that from Puerto Cabello single ones, like pin-holes, in the thickened crust. Indeed, as before stated, the two conditions exist together in the specimen from St. Vincent, and therefore prove that these differences only depend on degree of development.

Thus we are led to the conclusion that in the selection of material from foreign sources by the *Hirciniæ*, and in the supplying of it from itself by the *Geodiæ*, the sponge evinces the power not only of selection, but of transporting from place to place with definite arrangement what it requires, together with the power of producing this material itself when it cannot obtain it from other sources.

## ADDENDUM.

Insert immediately after "Family 2. Cavochaliniida," p. 277, *antè*, the following:—

*Patuloscula procumbens*, n. sp.

Cauliform, rhizomatous, procumbent, solid, throwing up thumb-like hollow processes, or simply branched, with large patulous vents; processes short, erect, annularly inflated, increasing in size upwards, and somewhat contracted at the orifice, which is large and circular. Texture resilient. Colour pale amber or deep dark amber, bordering on purple, which is probably the real colour when fresh. Surface smooth, even. Composition fibrous, resilient. Spicule of one form only, viz. acerate, smooth, curved, fusiform, sharp-pointed, 20 by  $1\frac{1}{2}$ -6000ths inch in its greatest dimensions, small, and scanty. Size of specimen  $5\frac{1}{2}$  inches high by  $1\frac{1}{2} \times 7$  inches square.

*Hab.* Marine.

*Loc.* West Indies, Grenada.

*Obs.* The light amber colour which gives this specimen such a beautiful appearance seems to have been produced by cleansing with acids, since some specimens of the same species in the British Museum still retain a trace of the "purple colour" common to this kind of *Chalina*. Besides a similar specimen to that in the Liverpool Free Museum, which was presented to the British Museum by Mr. T. H. Higgin, F.L.S. (reg. no. 77. 3. 9. 3) there are others in the latter, viz. no. 140, registered 45. 5. 12-20 and -21, and no. 264, registered 45. 5. 12-13, -15 and -16. It is some time since I gave the above name to this species, which will illustrate the group "Tubulodigitata" in my classification; and at the suggestion of Mr. T. H. Higgin, F.L.S., I now add the description.

To the above may also be added two very fine specimens of the same family from Grenada, and in the 'Argo' collection, viz. *Tuba plicifera*, de F. et M. p. 53, pl. x. fig. 2, and *Tuba* (*Callispongia*) *Eschrichtii*, de F. et M. p. 56, pl. xii. fig. 1. The former illustrates group S, viz. "Ciliata," in my Classification; and as the latter (which is more or less covered

with the usual aculeations) belongs to the genus "*Tuba*" as much as the former, I have given this generic name to it, but would place *this* in the 6th group, viz. "Aculeata." The specimen of *T. plicifera* is composed of thick ridged fibre, with a circular fringed orifice, about 10 inches high by 5 inches in diameter; and that of *T. Eschrichtii*, which is long and trumpet-shaped, is more or less covered with a remarkably irregular form of the outgrowth mentioned, about  $16\frac{1}{2}$  inches high and  $3\frac{1}{2}$  inches in the longest diameter at its orifice, which is elliptical and *not* fringed. All three specimens have the same light fawn-colour, and all three the same kind of acerate spicule; that of *T. plicifera* is 18 by  $\frac{2}{3}$ -6000ths inch, and that of *T. Eschrichtii* 18 by  $\frac{1}{2}$ -6000ths inch, in their greatest dimensions respectively, so that it is finest in the thickest fibre, but very scanty in all three.

Each specimen presents a young one at its base, which is *blind* at the free end (that is, without orifice).

*List of part of the Sponges from the West Indies in the Liverpool Free Museum collected by the Rev. H. H. Higgins, M.A., labelled "Argo Expedition, 1876," submitted for examination in the month of November 1881.*

## CARNOSA.

*Chondrilla nucula*, *Sdt.*, p. 268.

## CERATINA.

<i>Luffaria cauliformis</i> , n. sp., p. 268.	<i>Aplysina aerophoba</i> , <i>Nardo</i> , p. 270.
— —, var. <i>rufa</i> seu <i>fusca</i> , n.,	— <i>compressa</i> , n. sp., p. 270.
p. 269.	— <i>cauliformis</i> , n. sp., p. 270.
— —, var. <i>elongoreticulata</i> , n.,	— <i>longissima</i> , n. sp., p. 271.
p. 269.	— <i>fenestrata</i> , <i>de F. et M.</i> , p. 272.

## PSAMMONEMATA.

<i>Spongia officinalis auctt.</i> , p. 272.	<i>Polytherses</i> , <i>de F. et M.</i> , p. 274.
<i>Hircinia caracasensis</i> , n. sp., p. 273.	<i>Dysidea tubulosa</i> , n. sp., p. 275.

## RHAPHIDONEMATA.

<i>Chalina rubens</i> , <i>Pallas</i> , p. 276.	<i>Tuba digitalis</i> , <i>de F. et M.</i> , p. 277.
<i>Patulosecula procumbens</i> , n. sp.,	— <i>armigera</i> , <i>de F. et M.</i> , p. 278.
p. 365.	— <i>plicifera</i> , <i>de F. et M.</i> , p. 365.
<i>Tuba lineata</i> , var. <i>flabelliformis</i> ,	— <i>Eschrichtii</i> , <i>de F. et M.</i> , p.
<i>de F. et M.</i> , p. 277.	365.

## ECHINONEMATA.

*Ectyon sparsus*, *Gray*, p. 281.

and Acapulco Sponges.

HOLORHAPHIDOTA.

- |   |   |
|---|---|
| Halichondria panicea, <i>Johnst.</i> , p. 282.                                  | Reniera digitata, <i>Sdt.</i> , p. 287.   |
| Isodictya simulans, <i>Johnst.</i> , p. 282.                                    | Phorbas amaranthus, p. 287.   |
| Thalysias repens, <i>de F. et M.</i> ,<br>p. 282.                               | Esperia lævis, n. sp., p. 291.  |
| — carbonaria, <i>Lam.</i> , p. 282.   | Suberites ? sp., agglomerated with<br>shell-detritus, p. 350.                           |
| Fibularia massa, n. sp., p. 282.  | Cliona caribbæa, n. sp., p. 346.  |
| — ramosa, n. sp., p. 283.   | Terpios fugax, <i>de F. et M.</i> , p. 355.   |
| — anchorata, n. sp., p. 283.  | Donatia lyncurium, <i>Nardo</i> , p. 359.   |
| Halichondria birotulata, <i>Higgin</i> ,<br><i>Ann.</i> 1877, vol. xix. p. 296. | Geodia gibberosa, <i>Lam.</i> , = <i>G. tu-</i><br><i>mulosa</i> , <i>Bk.</i> , p. 362. |
| — isodictyalis, n. sp., p. 285.   |   |

*List of Sponges dredged by Capt. W. H. Cawne Warren in the Harbour of Acapulco &c. in 4-9 fathoms, July 1880, submitted for examination at the same time.*

- |   |   |
|---|---|
| Tuba acapulcoensis, n. sp., p. 279.     | Halichondria pustulosa (South At-<br>lantic Ocean), n. sp., p. 285. |
| Reniera fibulata, <i>Sdt.</i> , p. 284. | Donatia multifida, n. sp., p. 358.                                  |
| Halichondria isodictyalis, p. 285.      |   |

EXPLANATION OF THE PLATES.

*Note.*—All the spicules, with the exception of figs. 31 and 32, are drawn to a scale of 1-48th to 1-6000th of an inch, that their relative sizes may be seen; but figs. 31 and 32, being of a much larger size, are, for convenience, drawn to a scale of 1-48th to 1-1800th inch. The "more magnified" views of the smaller spicules are upon no scale at all, but intended to show in a larger form that which cannot be well shown in a smaller representation.

PLATE XI.

- Fig. 1.* *Halichondria pustulosa*, n. sp. (nat. size). *a a*, pustuliform eminences; *b*, the same, more magnified; *c*, skeletal spicule, long; *d*, subskeletal spicule, smooth; *e*, subskeletal spicule, short, spined; *f*, anchorate, front and lateral views; *g*, bihamate.
- Fig. 2.* *Halichondria isodictyalis*, n. sp. *a*, skeletal spicule; *b*, tibiella; *c*, anchorate, front and lateral views; *d*, bihamate; *e*, anchorate, more magnified, front and lateral views.
- Fig. 3.* *Reniera digitata*, *Sdt.* *a*, skeletal spicule; *b*, tibiella; *c*, microspined acerate.
- Fig. 4.* *Tuba lineata*, spicule of.
- Fig. 5.* *Tuba digitalis*, spicule of.
- Fig. 6.* *Tuba armigera*, spicule of.
- Fig. 7.* *Chalina rubens*, spicule of. *a*, point, more magnified.
- Fig. 8.* *Halichondria panicea*, *Johnst.* (*Amorphina*, *Sdt.*), spicule of.
- Fig. 9.* *Isodictya simulans*, *Bk.* (*Halichondria*, *Johnst.*), spicule of. *a*, point, more magnified.
- Fig. 10.* *Thalysias repens*, var. nov., spicule of. *a*, point, more magnified.
- Fig. 11.* *Thalysias carbonaria*, *Lam.*, spicule of. *a*, point, more magnified.
- Fig. 12.* *Fibularia ramosa*, n. sp. *a*, skeletal spicule; *b*, bihamates.
- Fig. 13.* *Fibularia massa*, n. sp. *a*, skeletal spicule; *b*, small acerate; *c*, bundle of trichites; *d*, bihamates.

- Fig. 14. *Fibularia anchorata*, n. sp. *a*, skeletal spicule; *b*, bihamates; *c*, anchorate; *d*, the same, more magnified, lateral view; *e*, sand-grains.
- Fig. 15. *Phorbas amaranthus*, spicule of.
- Fig. 16. *Esperia lævis*, n. sp. *a*, skeletal spicule; *b*, inequianchorate, front and lateral views; *c*, bihamate; *d*, bundle of trichites; *e*, minute inequianchorate; *f*, the same, more magnified, to show the sharp process of the shaft extended downwards.
- Fig. 17. *Esperia Cunninghamsi*, n. sp. *a*, skeletal spicule; *b*, variously formed head in the same; *c*, inequianchorate, front and lateral views; *d*, ? bihamate; *e*, tricurvate; *f*, bundle of trichites; *g*, more magnified view of lower end of inequianchorate, to show extension of petaloid arm upwards into a sharp process; *h*, more magnified view of ? bihamate, to show its shape.
- Fig. 18. *Esperia obscura*, n. sp. *a*, inequianchorate; *b*, the same, more magnified, in different views, to show its enigmatical appearance.
- Fig. 19. *Esperia*, minute equianchorate in several species of, *a*; *b*, more magnified view, to show its shape.
- Fig. 20. *Hymedesmia Johnsoni*, Bk. *a*, skeletal spicule; *b*, tricurvate; *c*, "trenchant" anchorate in natural position, lateral view; *d*, the same, diagrammatic, to show its shape; *e*, earliest visible form.
- Fig. 21. *Hymedesmia Schmidtii*, Carter, n. sp. *a*, skeletal spicule; *b*, bihamate; *c*, *d*, *e*, the same as just mentioned, this form being common to both species.

PLATE XII.

- Fig. 22. *Donatia multifida*, n. sp., natural size. *a a*, sponges; *b b b b*, tendrils of attachment; *c c*, bivalve shells, covered with a melobesian incrustation; *d*, spiniferous stellate; *e*, small sexradiate stellate; *f*, pistil-like process of the centre.
- Fig. 23. *Donatia*, Cape species. Spiniferous stellate.
- Fig. 24. *Desmacidon tibubans*, Sdt. *a*, skeletal spicule; *b*, subskeletal spicule; *c*, bihamate; *d*, anchorate; *e*, *f*, *g*, different views of the anchorate, more magnified, to show its equiterminal shape, &c.; *h*, rosette form.
- Fig. 25. *Spongia Dysoni*, Bk. *a*, skeletal spicule; *b*, spinispirula; *c*, the same, more magnified.
- Fig. 26. *Cliona caribbaea*, n. sp. *a*, skeletal spicule; *b*, spinispirula; *c*, the same, more magnified.
- Fig. 27. *Suberites coronarius*, n. sp. *a*, skeletal spicule; *b*, spinispirula; *c*, the same, more magnified.
- Fig. 28. *Alcyonium purpureum*, Lam. *a*, skeletal spicule; *b*, spinispirula; *c*, the same, more magnified.
- Fig. 29. *Terpios fugax*, spicule of.
- Fig. 30. *Terpios cerulea*, n. sp. *a*, spicule of; *b*, Oscillatorian filament; *c*, the same, more magnified.
- Fig. 31. *Geodia gibberosa*, Lam. Zone-spicule of.
- Fig. 32. *Xenospongia patelliformis*. *a*, skeletal spicule; *b*, stelliform flesh-spicule, largest size; *c*, the smallest size seen.
- Fig. 33. *Piacospongia melobesioides*. *a*, skeletal spicule; *b*, head of same, of a different form; *c*, large siliceous ball, elliptical; *d*, small siliceous ball, spherical; *e*, *f*, spinispirulas; *g*, surface of large siliceous ball when fully developed, much magnified; *h*, spherical ball, more magnified; *i*, spinispirula, more magnified, to show its spines &c.